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Promising impacts of mesenchymal stem cell therapy in treatment of SARS-CoV-2 (COVID-19)

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To the Editor

A novel coronavirus named COVID-19 has begun to spread in Wuhan, China from December 2019 and become a global health concern.[1] Individuals with underlying diseases are at greater risk and more prone to be critically ill in case of infection so that mortality rate is 49% in subjects entering intensive care units.[2] It has been reported that critically ill COVID-19 patients remarkably have elevated levels of pro-inflammatory cytokines including IL-6, G-CSF, IP10, MCP1, MIP1A, and TNFα, contributing to outbreak of cytokine storm.[3] These turn of events lead to acute respiratory distress syndrome and ultimately maybe death[2] and glucocorticoids were not efficient in reducing rate of mortality.[4]

It has been suggested that mesenchymal stem cell (MSC) transplantation could be considered as a beneficial approach in treatment many disease. MSC exerts its positive impacts through immunomodulation and differentiation stimulation.[5] It has proposed that pathogen molecules such as double-stranded RNA in virus is able to increase induction of toll-like receptors (TLRs) on MSC resulting in manifestation of immunomodulatory effects of MSC.[6] Darwish et al. demonstrated that MSC is potentially able to treat H5N1 infection which has a cytokine profile similar to COVID-19.[7] The mechanisms of action of MSC on COVID-19 treatment schematically are shown on Fig. 1.

Therefore, MSC therapy potentially could be considered as an efficacious and safe treatment approach in COVID-19-induced pneumonia. In this regard, Leng et al. recently demonstrated that with perfusion of 1×10^6 cells per kilogram of weight, almost all the clinical symptoms such as fever, breath shortness, and low oxygen saturation disappeared and the inflammation levels were relieved 2-4 days after MSC transplantation.[8] Moreover, in a critically ill 65 years old woman, MSC transplantation with 5×10^7 cells three times resulted in significant decrease in CRP and increase in CD3+, CD4+ and CD8+ T cells to the normal ranges. Also, CT images implied to remarkable relieve in pneumonia.[9] Furthermore, there are 30 registered studies investigating MSC therapy on COVID-19 to explore whether MSC transplantation could be able to shed the light in COVID-19 treatment. A summary of characteristics of registered studies are presented in Table 1.

Author contribution

Masoud Khorshidi: Conceptualiation, Investigation, Methodology, Software, Visualization; Meysam Zarezadeh: Data curation, Investigation, Validation, Visualization, Writing - original draft, Writing - review and editing; Mohammadreza Emami: Data curation, Visualization; Beheshteh Olang: Data curation, Visualization, Validation; Omid Moradi Moghaddam: Conceptualization, Project administration, Supervision, Visualization.

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